Emerging Consumer Preferences & Future of Electric cars in India

SHORT SYNOPSIS

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by

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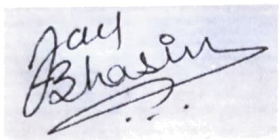
CERTIFICATE

I hereby declare that the short synopsis **"Emerging Consumer Preferences & Future of Electric cars in India"** being submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in **Management** under **School of Leadership and Management** of Manav Rachna International Institute of Research &Studies, Faridabad during the academic year **2021-2022**. It is a bona fide record of original work carried out under the supervision of **DR. NANDINI SRIVASTAVA**. It has not been submitted in full or part to any other university or institute for a degree or diploma. Further, it is certified that the short synopsis is plagiarism-free, and the proof has been submitted.



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Abstract

This study explores how customer tastes are changing in the Indian automotive sector, concentrating on the rapidly growing electric vehicle (EV) market. It seeks to examine how changes in consumer perceptions, environmental consciousness, and technical developments are influencing India's future with regard to electric vehicles. Important research topics include how consumers see EV technology, how government regulations and incentives affect the market, how infrastructure is developed, and how prepared the Indian market is for the shift to electric vehicles. The research additionally investigates at potential benefits brought about by improvements in battery technology and the integration of renewable energy sources, as well as issues like range anxiety, pricing concerns, and charging infrastructure. The results are aimed to give a thorough picture of the present situation and future prospects of electric vehicles in India, supplying important information to legislators, automotive manufacturers, and other EV ecosystem players. This study adds to our knowledge of the factors propelling India's electric car revolution and provides predictions for its future course.

The study is expected to survey 1000 current and potential EV customers using a combination of non-probability convenience sampling and purposive sample approaches. Respondents will be chosen according on their availability. The study aims to comprehend regional differences in EV adoption and customer sentiments within these metropolitan cities by concentrating on Delhi and Mumbai. It is anticipated that the results would foresee new trends and offer relevant data on the present status of EV market penetration in India. In light of the evolving Indian EV market, the study seeks to provide manufacturers, policymakers, and other industry players with useful information that will enable them to better align their strategies with customer preferences and market expectations.

Key words:*electric cars, Indian EV market,non-probability convenience sampling,government policies and incentives,EV adoption,consumer attitudes*

Introduction:

Despite the short-term impact of COVID-19, the electric vehicle (EV) market's cumulative successes over the preceding two years offer optimism: a trend of steady growth is expected to continue throughout the 2020s. 2019 saw EV sales reach 2.5 percent of all new car sales, as BEV and PHEV sales surpassed two million units. New, more stringent European emissions regulations encouraged automakers to prioritize the development and marketing of zero-emission cars, which in turn contributed to this. Another factor to take into account is the fact that China has a more established BEV market than any other nation. BEVs are still the most widely used EV technology in the US and Europe, although having a smaller market share than in China.

India is predicted to see a sharp increase in the number of electric vehicles (EVs) driven by its large population and expanding middle class in the years to come. This article will cover the potential and current issues facing the electric vehicle sector in India, as well as the policies and initiatives being put in place by the government to promote the usage of EVs.

By the end of 2022, the Indian car market was among the fastest-growing globally, with yearly domestic passenger vehicle sales reaching an all-time high and growth of 23.1% over 2021. It was worth over $100 billion, made up 7.1% of the country's GDP, and supplied 8% of its exports. As per "the Society of Indian Automobile Manufacturers (SIAM)", the production volume of the Indian automotive sector, which includes cars, commercial vehicles, two-wheelers, and three-wheelers, was 25.93 million units in FY 2022.

Table 1: Automobile Production Trends

Automobile Production Trends

(In Numbers)

Category	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Passenger Vehicles	4,020,267	4,028,471	3,424,564	30,62,280	36,50,698	45,78,639
Commercial Vehicles	895,448	1,112,405	756,725	6,24,939	8,05,527	10,35,626
Three Wheelers	1022,181	1,268,833	1,132,982	6,14,613	7,58,669	8,55,696
Two Wheelers	23,154,838	24,499,777	21,032,927	18,349,941	1,78,21,111	1,94,59,009
Quadricycles	1,713	5,388	6,095	3,836	4,061	2,897
Grand Total	**2,90,94,447**	**3,09,14,874**	**2,63,53,293**	**2,26,55,609**	**2,30,40,066**	**2,59,31,867**

Source: SIAM report

With sales of almost 79 million vehicles in the fiscal year 2022, India overtook Germany and Japan to take the third spot in the passenger car class. In the upcoming years, the Indian auto industry is predicted to continue expanding quickly due to factors including increased urbanization, population growth, rising disposable income, growing need for personal mobility, and easy access to finance and financing.

With a little over 41% of the market, Maruti Suzuki is the dominant company in the Indian auto sector. In addition, Hyundai (14.6%), Tata Motors (13.9%), Mahindra (8.8%), and Kia (6.7%) are significant competitors in the industry. In recent times, the industry has witnessed a surge in interest in electric cars, or EVs, as evidenced by many manufacturers revealing their ambitions to debut EV models in the Indian market.

Table 2: Manufacturer Analysis

Manufacturer Analysis

2022 Market share category	Brand	Volume				Share			Cumulative share			Rank		
		2021	2022	Change	%	2021	2022	Change	2021	2022	Change	2021	2022	Change
10%+	Maruti	1,364,788	1,576,026	211,238	15%	44.4%	41.6%	-2.7%	44%	42%	-2.7%	1	1	-
	Hyundai	505,033	552,511	47,478	9%	16.4%	14.6%	-1.8%	61%	56%	-4.5%	2	2	-
	Tata	331,182	526,821	195,639	59%	10.8%	13.9%	3.2%	72%	70%	-1.4%	3	3	-
5% to 10%	Mahindra	201,454	333,054	131,600	65%	6.5%	8.8%	2.3%	78%	79%	0.9%	4	4	-
	KIA	181,543	254,556	73,013	40%	5.9%	6.7%	0.8%	84%	86%	1.7%	5	5	-
2% to 5%	Toyota	130,749	160,375	29,626	23%	4.2%	4.2%	0.0%	88%	90%	1.7%	6	6	-
	Honda	89,153	95,022	5,869	7%	2.9%	2.5%	-0.4%	91%	92%	1.3%	8	7	1
	Renault	95,878	87,118	-8,760	-9%	3.1%	2.3%	-0.8%	94%	95%	0.5%	7	8	-1
Less than 2%	Skoda	23,849	53,721	29,872	125%	0.8%	1.4%	0.6%	95%	96%	1.1%	13	9	4
	MG	40,273	48,063	7,790	19%	1.3%	1.3%	0.0%	96%	97%	1.1%	9	10	-1
	Volkswagen	26,930	42,452	15,522	58%	0.9%	1.1%	0.2%	97%	99%	1.4%	12	11	1
	Nissan	35,946	34,565	-1,381	-4%	1.2%	0.9%	-0.3%	98%	99%	1.1%	10	12	-2
	Jeep	11,863	13,499	1,636	14%	0.4%	0.4%	0.0%	99%	100%	1.1%	14	13	1
	Citroen	624	6,066	5,442	872%	0.0%	0.2%	0.1%	99%	100%	1.2%	16	14	2
	Datsun	4,296	512	-3,784	-88%	0.1%	0.0%	-0.1%	99%	100%	1.1%	15	15	-
	Ford	33,480	-	-33,480	-	1.1%	0.0%	-1.1%	100%	100%	0.0%	11	-	-
PV Industry		3,077,041	3,784,361	707,320	23%							Auto Punditz		

Source:Autopunditz.com

During the past ten years, the Indian auto sector has displayed a notable development trend. According to “theSociety of Indian Automobile Manufacturers (SIAM)”, the Indian automotive industry, which includes “cars, commercial vehicles, two-wheelers, and three-wheelers”, has grown at a “compound annual growth rate (CAGR)”of 3.6% from 2010 to

2020 and is projected to grow at 11.3% from 2021 to 2027 as per report release by Grand View Research.

In terms of the passenger car segment, the industry has also shown a steady growth rate in recent years. In the fiscal year 2020-21, the passenger car segment recorded a degrowth of 3.23% (2,706,924) compared to previous year (2,797,377). This degrowth was mainly due to COVID-19 pandemic where the sale of vehicles stood at zero for very first time in history of automotive industry. Though in the fiscal year 2021-22, market has faced tremendous shortage of semiconductors, the Indian Automotive industry showed positive signs by registering a growth of nearly 11% compared to previous fiscal year thereby crossing the volumes of 3 Mio.

A combination of better semiconductor supply, more income, and pent-up demand—particularly for SUVs—helped the passenger vehicle market grow by over 27% to reach volumes of 3.9 million units, despite the year-long trend of rising inflation. Approximately in fiscal year 2022-23. The "Federation of Automobile Dealers Association (FADA)" and key analyst of this sector, stated that the Indian Automotive industry will continue to grow in fiscal year 2023-24 but in single digit (5-7%) due to inflationary pressures, routine price hikes and regulatory changes.

Table 3: OEM Market share Comparison

OEM MARKET SHARE COMPARISON: TY V/S LY

OEM	TY TOTAL	MARKET SHARE	LY TOTAL	MARKET SHARE
MARUTI	1293840	47.80%	1414346	50.56%
HYUNDAI	471535	17.42%	485309	17.35%
TATA	222011	8.20%	131197	4.69%
KIA	155686	5.75%	85171	3.04%
MAHINDRA	155539	5.75%	180263	6.44%
TOYOTA	93124	3.44%	114081	4.08%
RENAULT	92268	3.41%	89534	3.20%
HONDA	82074	3.03%	102016	3.65%
FORD	48042	1.77%	106711	3.81%
MG	35597	1.32%	21954	0.78%
VOLKSWAGEN	20440	0.76%	25736	0.92%
NISSAN	18884	0.70%	18039	0.64%
SKODA	11331	0.42%	14441	0.52%
FIAT	6553	0.24%	8579	0.31%
TOTAL	2706924	100%	2797377	100%

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Source: Autopunditz.com

Table 4: Growth in Volumes and Percentage

THIS(FY2021) V/S LY (FY2020) GROWTH IN VOLUMES AND PERCENTAGE

OEM	TY TOTAL	GROWTH	GROWTH %
MARUTI	1293840	-120506	-8.52%
HYUNDAI	471535	-13774	-2.84%
TATA	222011	90814	69.22%
KIA	155686	70515	82.79%
MAHINDRA	155539	-24724	-13.72%
TOYOTA	93124	-20957	-18.37%
RENAULT	92268	2734	3.05%
HONDA	82074	-19942	-19.55%
FORD	48042	-58669	-54.98%
MG	35597	13643	62.14%
VOLKSWAGEN	20440	-5296	-20.58%
NISSAN	18884	845	4.68%
SKODA	11331	-3110	-21.54%
FIAT	6553	-2026	-23.62%
TOTAL	2706924	-90453	-3.23%

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Source: www.autopunditz.com

Recent years have also witnessed a change in the Indian auto sector toward more ecologically friendly and fuel-efficient cars. As a result, hybrid and electric cars (EVs) are becoming more and more popular. The Government of India (GoI) joined the 2015 Paris Agreement with the aim of reducing fuel consumption and improving the environment. GoI committed to reaching about 50% of installed capacity for electric power by 2030 from non-fossil fuel-based energy sources. By 2030, adding more trees and forests to the landscape will act as a carbon sink, adding 2.5–3 billion tons of CO2 equivalent to the atmosphere. Furthermore endorsing the global campaign EV30@30 are "Canada, China, Finland, France, India, Japan, Mexico, the Netherlands (the newest member of the CEM), Norway, and Sweden, GoI." The campaign's target market share for EVs is thirty percent by 2030.

In summary, higher earnings, more urbanization, and a growing need for personal mobility are likely to fuel the Indian auto industry's growth trajectory in the years to come. But the

business also has to contend with issues including escalating competition, shifting customer tastes, and the requirement to adhere to tighter emission regulations.

Current State of the EV Market:

Compared to some other nations, India has been slower to embrace electric vehicles (EVs), with just 1% of new automobiles sold there being electric. Nonetheless, the industry has experienced tremendous expansion in recent years, with sales of electric vehicles rising from barely 1,200 in 2018 to over 14,000 in 2021 and about 70,000 units through Q3 of 23. The Indian government has set an aspiring goal of having 30% of all cars on the road by 2030, and a number of significant manufacturers have said that they would be introducing electric vehicles (EVs) to the country in the near future.

The electric two-wheeler segment is the largest in India, accounting for over 95% of electric vehicles sold in the country. The electric car segment is still very small, accounting for less than 5% of total electric vehicle sales.

The top-selling electric cars in India are the Tata Nexon EV, TATA Tiago, TATA Tigor, MG ZS EV, and Hyundai Kona.

According to report by PwC, India is expected to have 5.06 Million vehicles on the road by 2030, accounting for 30% of all passenger vehicles sold in the country.

The Indian car industry:

After China, the US, and Japan, the automobile sector in India is the fourth biggest globally. The sector directly and indirectly employs about 35 million people and makes for around 7.5% of India's GDP. A small number of well-known companies control 85% of the Indian auto market, including “Maruti Suzuki, Hyundai, Tata Motors, Mahindra & Mahindra, and Kia”.

The Indian automobile industry is anticipated to expand at a “compound annual growth rate (CAGR)” of 9% between 2020 and 2025, propelled by rising disposable incomes and urbanization, according to a research by IHS Markit.The Make in India campaign and the “Automotive Mission Plan 2026” are two of the programs and initiatives the Indian government has launched to support the industry's expansion. The government's goal is to make India a global hub for automobile manufacture.

Major Players

a. Maruti Suzuki

Maruti Suzuki, one of the key player in the Indian car industry. “Maruti Suzuki” is the largest car manufacturer in India and has a market share of 40.86% during fiscal year 2022-23.The company was founded in 1981 and is a subsidiary of “Japanese automaker Suzuki Motor Corporation”.

According to “the Society of Indian Automobile Manufacturers (SIAM)”, Maruti Suzuki sold a total of 1.96 million cars in FY 2022-23 including export of 0.26 Mio exports, which was a cumulative growth of 15.9% as against volumes of fiscal year 2021-22 Maruti Suzuki's best-selling models in India include the“Grand Vitara, Brezza, Ertiga and XL6”.

The company has a strong presence in the Indian small car segment and has been focusing on introducing more fuel-efficient and environmentally friendly cars, such as the CNG (compressed Natural gas) and hybrid variants of its models.

Maruti Suzuki has been investing in expanding its manufacturing capacity in India and has set up several new plants in recent years, including a manufacturing facility in Gujarat that has a capacity of producing 750,000 cars per year thereby making overall capacity of 1.3 Mio cars/ year which is fully utilised. In recent media interaction during announcing of financial results for Q1 FY23 the board has announced to create additional capacity of 1 Mio. Vehicles per year. Maruti According to a report by Brand Finance, Maruti Suzuki is considered to be 2ndmost valuable car brand in India in 2023.

Table 5: Indian OEMs and valuable auto Brands

INDIAN OEMs AMONG TOP 100 MOST VALUABLE AUTO BRANDS		
Company	**2023 rank**	**2022 rank**
Mahindra & Mahindra	30	42
Maruti Suzuki India	40	43
Bajaj Auto	48	41
Hero MotoCorp	52	46
Tata Motors	61	66
TVS Motor Co	76	81
Ashok Leyland	78	78
Royal Enfield	79	84
Source: Brand Finance		

Source:Autopunditz.com

b. Hyundai

Hyundai Motor India Limited is the second-largest automobile manufacturer in India, accounting for around 14.5% of the market. Established in 1996, this affiliate of Hyundai Motor Company, based in South Korea, has had a noteworthy influence on the Indian automotive industry. The Society of Indian Automobile Manufacturers (SIAM) reports that Hyundai sold 525,088 automobiles in the 2022–2023 fiscal year, a 9% increase over the previous year. The Grand i10, Venue, Elite i20, and Creta are among of its best-selling models in India.

Table 6: Growth in Volumes and Percentage

THIS(FY2021) V/S LY (FY2020) GROWTH IN VOLUMES AND PERCENTAGE

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HONDA	82074	-19942	-19.55%
FORD	48042	-58669	-54.98%
MG	35597	13643	62.14%
VOLKSWAGEN	20440	-5296	-20.58%
NISSAN	18884	845	4.68%
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FIAT	6553	-2026	-23.62%
TOTAL	2706924	-90453	-3.23%

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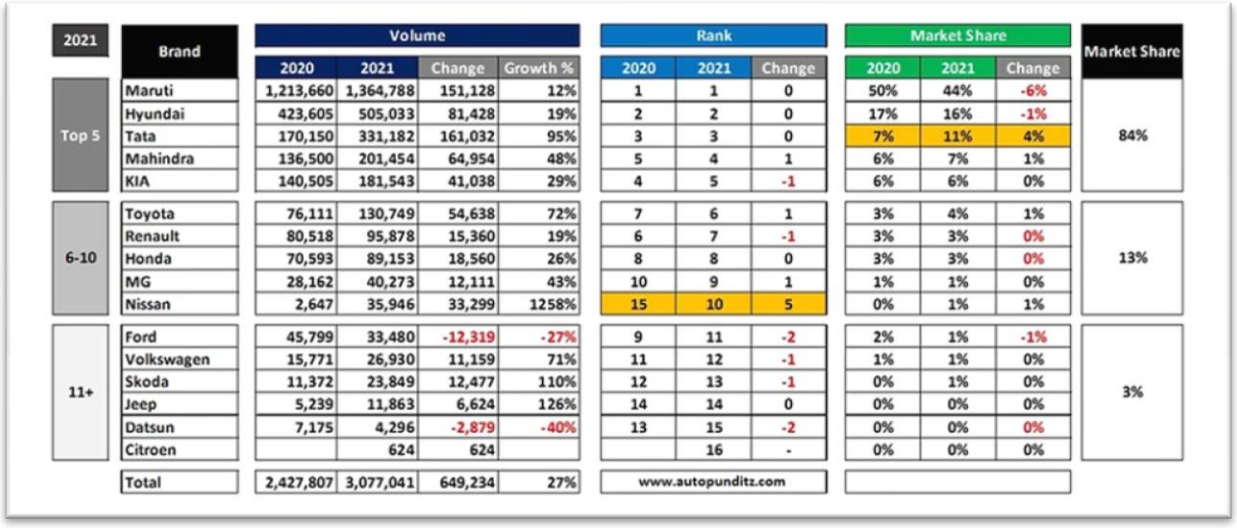
Source: Autopunditz.com

The Kona Electric and the Ioniq hybrid are two of the new models that the business has introduced in recent years. Additionally, it is concentrating on developing car technologies, particularly hybrid and electric drivetrains. Hyundai has opened many new plants in India to

expand its industrial presence. A prominent facility in Andhra Pradesh has the capacity to build up to 300,000 automobiles each year.

Table 6: Brand and Volume, Market Share 2020-2021



2021	Brand	Volume				Rank			Market Share			Market Share
		2020	2021	Change	Growth %	2020	2021	Change	2020	2021	Change	
Top 5	Maruti	1,213,660	1,364,788	151,128	12%	1	1	0	50%	44%	-6%	84%
	Hyundai	423,605	505,033	81,428	19%	2	2	0	17%	16%	-1%	
	Tata	170,150	331,182	161,032	95%	3	3	0	7%	11%	4%	
	Mahindra	136,500	201,454	64,954	48%	5	4	1	6%	7%	1%	
	KIA	140,505	181,543	41,038	29%	4	5	-1	6%	6%	0%	
6-10	Toyota	76,111	130,749	54,638	72%	7	6	1	3%	4%	1%	13%
	Renault	80,518	95,878	15,360	19%	6	7	-1	3%	3%	0%	
	Honda	70,593	89,153	18,560	26%	8	8	0	3%	3%	0%	
	MG	28,162	40,273	12,111	43%	10	9	1	1%	1%	0%	
	Nissan	2,647	35,946	33,299	1258%	15	10	5	0%	1%	1%	
11+	Ford	45,799	33,480	-12,319	-27%	9	11	-2	2%	1%	-1%	3%
	Volkswagen	15,771	26,930	11,159	71%	11	12	-1	1%	1%	0%	
	Skoda	11,372	23,849	12,477	110%	12	13	-1	0%	1%	0%	
	Jeep	5,239	11,863	6,624	126%	14	14	0	0%	0%	0%	
	Datsun	7,175	4,296	-2,879	-40%	13	15	-2	0%	0%	0%	
	Citroen		624	624			16	-	0%	0%	0%	
	Total	2,427,807	3,077,041	649,234	27%	www.autopunditz.com						

Source: Autopunditz.com

c. Tata Motors

With a market share of around 13.39%, Tata Motors, a well-known automotive firm worldwide, is the third-largest car manufacturer in India. Established in 1945, it presently functions in more than 175 nations. Tata Motors sold 484,843 cars in the fiscal year 2022–2023, up 32% from the previous year, according to the Society of Indian Automobile Manufacturers (SIAM). This was a huge sales jump for the company. Their top-selling vehicles in India include the Harrier, Tiago, Tigor, Nexon, and Safari. Electric versions of the business's well-known Nexon, Tiago, and Tigor models are among its many fuel-efficient and environmentally friendly car types. In the upcoming years, the company intends to introduce even more electric models. Tata Motors is building additional plants in India to increase its production capacity.

Even while EVs still cost more to buy initially than traditional cars, buyers should save money in the long run because to their reduced lifetime operating expenses. This change is being expedited by the Indian government, which is also encouraging the adoption of EVs

through policies and incentives including tax cuts, subsidies under the FAME plan, and investments in charging infrastructure.

Need for electric vehicles (EVs):

In addition to lowering costs, the use of electric vehicles (EVs) in India can help solve important issues facing the country, such as energy security, air pollution, and climate change. Because EVs have no tailpipe emissions, they aid in reducing air pollution, which is a serious problem in India due to its heavily polluted cities. Both air quality and public health may benefit from this change. Furthermore, India's energy security is at stake due to its reliance on imported fossil fuels for transportation. By using home electrical sources, EVs can lessen this reliance and improve energy security. India, one of the biggest greenhouse gas polluters in the world, may lessen the effects of climate change by switching to electric vehicles in the transportation sector. This shift can reduce carbon emissions dramatically.

Comparison of some popular models:

a) A popular electric SUV with a range of 312 km and 453 km on a single charge is the "Tata Nexon EV Prime and Max." It has two lithium-ion batteries that have a capacity of 30.2 kWh and 40.5 kWh each. A DC fast charger can charge them to 80% capacity in under one hour.
b) Another well-liked electric SUV with a 419 km range on a single charge is the "MG ZS EV." With a DC fast charger, the 44.5 kWh lithium-ion battery that comes with it can be charged to 80% capacity in 50 minutes.
c) A premium electric SUV with a 452 km range on a single charge is the "Hyundai Kona Electric." With a DC fast charger, the 39.2 kWh lithium-ion battery that comes with it can be charged to 80% capacity in just 57 minutes.
d) With a single charge, the "Mahindra XUV400" is an electric SUV with a 456 km range. With a DC fast charger, the 39.4 kWh lithium ion battery that comes with it can be charged to 80% capacity in just 50 minutes.
e) A well-liked electric car with a 315 km range on a single charge is the "Tata Tigor EV." With a DC fast charger, the 26 kWh lithium-ion battery that comes with it can be charged to 80% capacity in about 1.5 hours.

It's important to remember that a number of variables, including the power source, the driving environment, the temperature, and the habits of the user, might affect the range and charging time of these EV versions. It's crucial to take these things into account before making a purchase.

The EV car selling in India:

In FY 2020-21, a total of 5,905 electric cars were sold in India, which is a growth of 27% from the previous year.Tata Motors' Nexon EV was the best-selling electric car in India during FY 2020-21, with a total of 3,803units sold. In Q1 2023 BEVs has reached all time high sales of 21,109 units due to introduction of new products from TATA, Mahindra, Citroen and BYD.

A number of noteworthy electric cars (EVs) that are becoming more popular in India are the Hyundai Kona, Citroen eC3, Hyundai Tigor EV, Tata Tiago EV, MG ZS EV, and Mahindra XUV400. By providing incentives to EV buyers and launching programs like the FAME India plan, the Indian government is aggressively promoting the use of EVs. Incentives are also being introduced by a number of state governments in India, including EV purchase subsidies, road tax exemptions, and lower power costs for charging.

Nonetheless, only a small portion of all automobile sales in India are electric, with gasoline and diesel cars still accounting for the majority of sales. The insufficient infrastructure for charging EVs is a major obstacle to their widespread adoption.

In order to address this, a large number of companies and company owners are setting up charging stations and creating creative solutions, such as mobile charging units.India's electric vehicle sales are increasing, and with further efforts from the public and private sectors, it is anticipated that the country's EV adoption will continue to rise in the years to come.

The Use of Electric Vehicles: Initiatives and Regulations

The Indian government has put in place a number of laws and initiatives to encourage the use of electric vehicles (EVs). With the "Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) program," which was unveiled in 2015, it supports EV industry research and development while providing incentives for EV buyers. The government has also set a goal of having all new automobiles sold in India be electric by 2030. In order to ease this transition, it also intends to outfit charging stations and public roads.

Government Initiatives

The Indian government has been taking various initiatives to promote the adoption of electric vehicles (EVs) in the country. Here are some of the government regulations on EV cars in India:

The "FAME" initiative was launched by the Indian government in April 2015 with the objective of increasing the use of hybrid and electric cars (EVs). The scheme provides financial assistance and incentives to EV producers, consumers, and suppliers of charging infrastructure. Furthermore, buyers of electric vehicles are eligible to get income tax savings of up to Rs 1.5 lakh under Section 80EEB of the Income Tax Act 1961. To further lower the cost of EVs, the government lowered the Goods and Services Tax (GST) on them from 12% to 5%. By eliminating road tax and registration costs, some Indian state governments have further promoted the usage of electric vehicles.

As required by the Ministry of Road Transport and Highways, EVs are now required to have green number plates for easy identification and access to designated lanes and public charging stations. Additionally, a number of state governments have developed e-mobility programs that offer financial aid and subsidies to suppliers of charging infrastructure, EV manufacturers, and users.

The primary objectives of the Indian government's rules pertaining to electric cars (EVs) are to encourage the growth of local manufacturing and infrastructure, as well as to lower costs, improve accessibility, and increase the allure of EVs for customers. Banks and other financial organizations are supporting these government initiatives by offering loans for electric cars at lower interest rates than those for cars with conventional internal combustion engines.

Challenges and Opportunities: EV Sector in India

The absence of infrastructure for charging EVs is one of the main issues facing the Indian EV sector. Compared to conventional petrol stations, the number of public charging stations is still small, despite the fact that certain cities have started to establish them. This situation may deter potential purchasers and provide challenges for EV users when traveling long distances. Furthermore, EVs are now more expensive in India than gasoline-powered cars, although this is anticipated to change as local manufacture and expanded production drive down the cost of batteries.

In spite of these obstacles, India's EV industry has a lot of potential. With its abundance of lithium resources—a vital component of EV batteries—the nation has the potential to become into a significant hub for the manufacture of EV batteries.

The electric vehicle (EV) sector in India is facing a number of obstacles that are impeding its expansion. The high initial cost of EVs is a major barrier that discourages many prospective purchasers. This problem is exacerbated by the cost of batteries and other electric parts, which are more expensive than those in conventional gasoline and diesel cars. Another

significant obstacle is the absence of a strong infrastructure for charging. Customers are reluctant to purchase electric vehicles (EVs) because of the scarcity of charging stations and the length of time it takes to charge an EV. As a result, they doubt if EVs are feasible for daily usage.

Concerns over battery disposal, lack of customer knowledge, restricted vehicle alternatives, and range anxiety are among other difficulties. Despite advancements in this field, range anxiety is still a major problem since EVs' short range makes them appear inappropriate for long-distance travel. Additionally, undermining customer choice is the dearth of varied and reasonably priced EV choices available in the Indian market. Furthermore, the lack of knowledge among prospective consumers regarding the advantages of electric vehicles and the technology underlying them influences their inclination to switch from conventional automobiles. Finally, customer reluctance is increased by environmental worries about the recycling and disposal of EV batteries.

Given these obstacles, businesses are making a concerted effort to remove them by building charging infrastructure, releasing EV models at lower prices, and raising public knowledge of the advantages of EVs.

The Indian Consumer

Notwithstanding their diversity, Indian automobile purchasers have similar criteria while selecting a car. They place a high emphasis on obtaining the most value for their money and look for vehicles that strike a balance between price and a solid feature set. Another important consideration is fuel economy, particularly in light of India's growing gasoline prices, which are driving consumers to choose vehicles with higher fuel economy and lower running expenses. Their choice is also greatly influenced by an automobile's prospective resale value, with a preference for vehicles that hold their worth over time.

Because of the rising frequency of traffic accidents, consumers are now more likely to choose automobiles with cutting-edge safety technologies like airbags, ABS, and EBD. As a result, safety has become a top priority. Brand reputation is important because consumers want well-known companies that are regarded for their dependability and excellence. Because purchasers are drawn to contemporary and fashionable cars, the car's appearance and style are also quite important. Lastly, customers place a high value on after-sale support, favoring companies with a wide service network and dependable assistance. The changing interests and expectations of Indian automobile customers are reflected in this all-encompassing strategy.

Studying the future of EV cars in India is an important research topic for several reasons:

The electric vehicle (EV) market in India is still in its early stages, offering a dynamic environment with many potential and special problems. The country is gradually moving toward electric vehicles, therefore it's important to understand how this industry will develop. With the Indian government offering a range of incentives for EV purchases, including tax cuts, subsidies, and alluring financing alternatives, the regulatory climate is crucial. Evaluating these regulations' effects and effectiveness is crucial to determining how government actions could affect EV adoption in India in the future.

Another important factor is consumer behavior. Understanding consumer attitudes, readiness to invest in EVs, and perceptions of them might help determine the pace and scope of EV adoption in India. This entails being aware of the elements influencing consumer decisions in this industry.

The creation and availability of charging stations, in particular, are major infrastructure obstacles that have a direct impact on the uptake of electric vehicles. Researching the challenges of creating a nationwide network of charging stations and how this affects the adoption of electric vehicles might help shape infrastructure development plans for the future.

Furthermore, one important factor to think about is how EVs will affect the environment. Policy choices and public opinion can be influenced by researching the possible advantages of electric vehicles (EVs) for improving air quality and mitigating climate change in the Indian setting. In order to better understand how the switch to EVs affects environmental results and to link technology progress with ecological sustainability, this research might be helpful.

Consumer Preferences:

A variety of factors, including government incentives, charging infrastructure, brand diversity, cultural trends, and environmental, economic, performance-related, and technological aspects, all have an impact on consumer preferences for electric vehicles (EVs). EVs are positioned as an environmentally beneficial substitute for conventional cars because to the push towards sustainability and the reduction of carbon emissions. Their attractiveness is increased by financial incentives like government subsidies and reduced operational expenses. EVs are becoming more and more popular due to their performance features, such as their silent operation and rapid torque, as well as improvements in battery technology that lessen range anxiety. Customers' practical and aspirational demands are met by the

development of the infrastructure for charging, the availability of a large variety of models, and the incorporation of cutting-edge technology.

Consumer interest in electric vehicles is being shaped by these variables, together with the rising societal emphasis on sustainability and the impact of early adopters. These factors point to a healthy development trajectory for electric mobility.

The contentment and pleasure of consumers with Electric Vehicles (EVs) are a result of a well-balanced combination of economic efficiency, environmental responsibility, and innovation. Because of the cars' silent operation, less maintenance costs, and the advantages of driving an emission-free vehicle for the environment, owners frequently express high levels of happiness. The ability to charge at home makes it unnecessary to visit petrol stations on a daily basis, which improves everyday convenience and raises enjoyment levels. Beyond expectations, EVs offer a feeling of performance and elegance because to their smooth driving and rapid acceleration. The ownership experience is being enhanced by government incentives and the growing infrastructure for charging EVs, which makes them not only an appropriate choice but also a source of pride and happiness for their owners.

Problem Statement

To comprehend the elements that affect Indian consumers' happiness levels with electric vehicles and to assess how charging infrastructure affects those satisfaction levels. This study intends to shed light on the advantages and disadvantages of electric vehicles in the Indian market and offer suggestions to legislators and automakers on how to increase the uptake of electric vehicles in India by resolving issues with infrastructure for charging and customer satisfaction.

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Literature Review

A literature review is an essential component of any research endeavours since it provides an in-depth understanding of the current state of knowledge in a particular field of study. Research projects must include a literature review since it aids in "identifying gaps in knowledge, establishing a theoretical framework, and providing a foundation for the study."

Some observations about how the cost of electric vehicles affects consumer happiness in the Indian market.

According to Sinha (2020), the growing expenses associated with battery manufacture may impede the growth of the electric car industry in India. In the meanwhile, Duggal (2022) examines the Indian government's initiatives to increase the percentage of electric cars in the country's automobile fleet, noting the availability of three distinct EV models at the moment. These studies, however, don't specifically look at how pricing affects customer happiness.

In a similar vein, Dang (2018) investigates the ways in which different aspects of e-retailing affect customer satisfaction in India. According to the study, there is a positive correlation between customer happiness and perceived utility, simplicity of use, and trust. This implies that variables other than pricing may have an effect on customer satisfaction. Although this study isn't only focused on electric cars, it does show that a variety of factors may influence how satisfied customers are with this industry.

Consumer satisfaction may not always rise when more electric vehicles are offered on the Indian market.

Sinha (2020) identifies a number of obstacles that might prevent the spread of electric vehicles in India, such as production costs, escalating battery costs, and environmental issues brought on by battery waste. **Asaad (2018)** found that Indian consumers are frequently hesitant to adopt new technology, and that consumers' favorable attitudes are crucial to the success of electric automobiles. According to **Hoch (2012**), meeting consumer expectations in light of the reality of electric cars and infrastructure is necessary to turn electric vehicles into a success story. Last but not least, **Dang (2018)** discovered that consumer happiness with e-retailers in India is positively influenced by perceived utility, perceived ease of use, and trust. This suggests that these characteristics may also be significant for customer satisfaction with electric automobiles in the Indian market**.**

Several variables impact the research on consumer satisfaction with electric automobiles in the Indian market. Customer satisfaction is greatly impacted by how well-designed and easy to use the websites of automobile manufacturers. While **Kohli (2020)** classified the technical features of passenger automobiles as appealing, must-have, one-dimensional, and indifferent**, Nataraj (2012)** listed the "Auto Gear Shift" system as a necessary feature. In order to optimize customer satisfaction with current electric car and infrastructure realities, **Hoch (2012)** presented an optimization strategy.

Additionally, **Khurana (2020)** has looked on the significance of client sentiments.He discovered that attitudes play a major mediating role in the adoption of electric automobiles in India, with barriers to consumer acceptance including high cost, lack of infrastructure for charging, time, and range anxiety.

The research' findings suggest that a variety of factors, including website quality, technological characteristics, infrastructure and vehicle optimization, and attitudes toward electric vehicles, impact consumer satisfaction with electric cars in the Indian market.

Looking into the literature there are several barriers to the adoption of electric cars in the Indian market.

According to **Panwar (2019),** the main obstacles include India's reliance on fossil fuels, deficiency in lithium supplies, issues with grid integration, high car weights of electric vehicles, and a lack of infrastructure for charging stations. In order to determine the relative importance of the various obstacles to EV adoption in India**, Kumar (2021)** used the AHP-Fuzzy TOPSIS technique. He draws the conclusion that lack of charging infrastructure, high

initial cost, and range anxiety are the three main challenges. To determine the external, financial, behavioral, technological, and infrastructure hurdles to the adoption of electric vehicles (EVs) in India, **Tarei (2021)** employs multi-criteria decision-making tools and concluded that factors such as "performance and range, total cost of ownership, lack of charging infrastructure, and low consumer awareness of EV technology" are crucial in determining EV adoption.

The main obstacles to EVs gaining popularity in the market are family issues that impede the choice to purchase one and confusing government rules regulating EVs. According to the papers, in order to overcome the obstacles under investigation, India should strengthen and implement its regulatory framework, raise public and consumer awareness, and concentrate on high-priority barriers and sub-barriers by allocating preferred resources to their resolution. **Goel (2021)**

There are several key drivers and barriers to EV adoption in India, which vary across different regions and socioeconomic groups.

India has a number of obstacles to the adoption of electric vehicles (EVs), including financial, behavioral, infrastructural, and technological ones **(Tarei 2021)**. The primary barriers to EV adoption in India include "poor performance and range, total cost of ownership, a lack of infrastructure for charging, and a lack of consumer awareness of EV technology"**(Tarei 2021; Patyal 2021**). Government regulations and investments made by Indian automakers in the EV market are factors that facilitate the adoption of EVs in India (Bansal 2020). The studies indicate that the barriers to India's adoption of electric vehicles are interconnected. As a result, by giving high-priority obstacles and sub-barriers preferred treatment, authorities should give them top priority (Tarei 2021). All things considered, the study sheds light on the complex relationship between the adoption of EVs in India and the formulation of public policy and decision-making processes.

According to the literature, EVs are probably going to become more and more significant in the transportation industry in the years to come. The development of charging infrastructure, government rules, growing consumer adoption, and advancements in battery technology are all propelling the growth of the electric vehicle (EV) industry, even if there are still obstacles to be addressed.

Research Gaps

Research on the variables influencing Indian consumers' attitudes toward electric vehicles is scarce. This encompasses elements including knowledge, attitudes, perceived advantages and

obstacles, and financial readiness. To find out how these elements affect Indian consumers' adoption of electric vehicles, more study is required.

Although there has been limited research on Indian customers' attitudes about EVs, further empirical study is required to fully comprehend Indian consumers' perceptions of EVs and the variables influencing their adoption or rejection of EVs. This might involve both quantitative and qualitative research to determine the variables most closely linked to the adoption of electric vehicles (EVs) and to better understand the attitudes and opinions of consumers.

Research Questions

1. What potential challenges exist for the Indian market's adoption of electric vehicles?

2. In the Indian market, what factors are most important for determining customer happiness with electric cars?

3. What impact does the availability of electric vehicles have on consumer satisfaction in the Indian market?

4. How does consumer satisfaction relate to the cost of electric automobiles in the Indian market?

5. How do the main forces behind and obstacles to EV adoption in India differ between areas and socioeconomic classes?

Objectives

i. To determine the variables influencing Indian consumers' happiness with electric vehicles.
ii. To ascertain consumer satisfaction levels with electric vehicles in the Indian market.
iii. Investigating possible obstacles to the market's acceptance of electric vehicles in India.

iii. Make suggestions to companies of electric vehicles on how to get over roadblocks and increase sales in the Indian market.

Research Methodology:

The aim of this research study is to build a deeper understanding of the important factors that influence customer satisfaction with electric cars in the Indian market. The study will determine the level of customer satisfaction with electric cars in the Indian market. It is also intended to explore the potential barriers to the adoption of electric cars in the Indian market.

The purpose of this exploratory study, which is based on quantitative data, is to assess a phenomena using statistical analysis. To investigate the variables and create a theoretical or conceptual framework that is tested using data points, the deductive research approach will be used (**Collis & Hussey, 2014**). Potential EV buyers, present EV drivers, and even those who haven't thought about buying an EV will all provide data for the project. The findings will demonstrate how customers are impacted by various EV adoption phases and the disparity in consumers' awareness of particular issues, hence adding value and giving these considerations top priority while looking for and assessing EVs.

After noticing an issue or trend in the automobile industry, a preliminary survey questionnaire will be created. This will allow for the deductive study necessary to address the suggested

questions and finish the main data gathering. The survey's questions will be derived from the conceptual framework to guarantee that the information gathered will support the study's analysis and enable it to reach a conclusion that addresses the research issue. The purpose of the questionnaire is to elicit reflection from the participants on their decision-making process and the significance of particular aspects while evaluating different vehicle options. Because of their high representativeness and ease of use, surveys have shown to be an effective research approach for quantitative research. Conducting the survey allows reach to be widespread and ensures availability to all groups the research aims to study.

The most common and most likely to have an influence on the choice to adopt or not adopt EVs will then be the basis for the development of a conceptual framework. Multiple logistic regression analysis will be used to test the framework under actual observation. After transforming the dependent variable, logistic regression estimates the parameters using maximum likelihood estimation as opposed to least squares. The connection between a collection of independent factors and a categorical dependent variable is described by logistic regression. The choice made by clients to buy an electric car or not will be the dependent variable. The independent variables will be the many aspects and difficulties that affect their decision.

*Participants:*Anyone who is considering/wishes to purchaseelectric car

Sample Size and Sampling Method:

With a focus on EV vehicle buyers in Delhi and Mumbai, the current study will combine "non-probability convenience sampling" and "purposive sampling" techniques. Getting a sample size of at least 1000 clients is the goal. Since convenience sampling is thought to be a convenient, affordable, and time-efficient method, it will be utilized to select the respondents depending on their availability (**Baker et al., 2013**). Purposive sampling will then be applied in order to find and choose participants or groups that fit particular inclusion requirements.

A total of 500 respondents data will be taken for the study through survey..

Method of Data Collection

Questionnaire Design: There will be both closed-ended and open-ended items in this self-structured questionnaire. It will address a number of topics, including:

a) Details about the demographics (age, gender, income, region)
b) Perception and knowledge of EVs

c) A few factors that affect whether or not an EV is purchased include price, charging infrastructure, environmental concerns, and government incentives.
d) Choices for EV brands, models, and features
e) Issues and obstacles to the adoption of EVs

To effectively reach a larger audience, the questionnaire will be delivered online via social media, email, and specialized survey platforms.

Data Analysis

Statistical software will be utilized for the analysis of the data obtained from the questionnaire. To compile the demographic data and comprehend the answer distribution, descriptive statistics will be employed. Regression analysis and chi-square tests are two examples of inferential statistics that may be used to find important correlations between customer preferences or attitudes toward electric vehicles and demographic characteristics.

Scope of the study

With an emphasis on electric cars (EVs), the research study "Emerging Consumer Preferences & Future of Electric Cars in India" seeks to examine how the Indian automotive industry is changing. This study is pertinent and timely given India's commitment to lowering carbon emissions and the government's drive for electrification of automobiles. It looks for the main causes of customer interest in electric vehicles (EVs), such as developments in technology, economic benefits, and environmental concerns. Through the examination of data from a wide range of Indian demographics, the study will provide insights into consumer attitudes, preferences, and possible roadblocks to the adoption of electric vehicles. In order to shape the future of the EV industry in India, automakers, legislators, and environmental strategists will find these results to be extremely important.

The results of the study may have an impact on marketing plans, policy creation, and product development, which would greatly speed up the adoption of EVs across the nation.

Expected outcomes:

The goal of this study is to identify the many factors that affect the purchasing of electric cars in India, including infrastructure, cost, and customer attitudes. It aims to analyze how Indian customers see electric vehicles, highlighting pre-existing prejudices and the impact of environmental conscience. The study will examine how battery life and range—two technological characteristics of electric cars—affect consumer preferences and buying

choices. It will examine how government regulations and the infrastructure for charging play a part in shaping consumer behavior and adoption rates.

In addition, the research will examine how sensitive the Indian market is to pricing, taking into account both up-front and possible long-term expenditures. It will also look at the sociocultural aspects of the adoption of electric vehicles and compare these purchasing patterns to those of conventional cars. The research attempts to understand diverse purchasing patterns across various customer demographics and geographic locations by offering segment-specific information. Based on these findings, stakeholders will receive useful guidance that projects future advancements and their implications for market dynamics. The research also intends to evaluate the environmental implications of a shift toward electric vehicles and identify the areas in need of additional customer awareness and education in order to gradually push India toward a more sustainable automotive future.

In India, electric vehicle sales have a promising future with large increase anticipated in the upcoming years. Even if there are obstacles to overcome, such the high cost of EVs and the absence of a charging infrastructure, the industry has a lot of chances, especially when it comes to government assistance and battery production. In the years to come, it appears probable that electric cars will become more and more significant in India's transportation system due to the government's aggressive adoption objectives for EVs and the introduction of regulations and initiatives to promote the industry.

It is anticipated that the study would offer insightful information on the present and potential future paths of the electric vehicle (EV) industry in India. It will pinpoint the main variables influencing consumer preferences as well as any possible roadblocks to the adoption of EVs. Policymakers, automakers, and other stakeholders may find this information useful in creating plans to encourage the expansion of the electric vehicle industry in India.

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Emerging Consumer Preferences & Future of Electric cars in India

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Abstract

This study explores how customer tastes are changing in the Indian automotive sector, concentrating on the rapidly growing electric vehicle (EV) market. It seeks to examine how changes in consumer perceptions, environmental consciousness, and technical developments are influencing India's future with regard to electric vehicles. Important research topics include how consumers see EV technology, how government regulations and incentives affect the market, how infrastructure is developed, and how prepared the Indian market is for the shift to electric vehicles. The research additionally investigates at potential benefits brought about by improvements in battery technology and the integration of renewable energy sources, as well as issues like range anxiety, pricing concerns, and charging infrastructure. The results are aimed to give a thorough picture of the present situation and future prospects of electric vehicles in India, supplying important information to legislators, automotive manufacturers, and other EV ecosystem players. This study adds to our

knowledge of the factors propelling India's electric car revolution and provides predictions for its future course.

The study is expected to survey 1000 current and potential EV customers using a combination of non-probability convenience sampling and purposive sample approaches. Respondents will be chosen according on their availability. The study aims to comprehend regional differences in EV adoption and customer sentiments within these metropolitan cities by concentrating on Delhi and Mumbai. It is anticipated that the results would foresee new trends and offer relevant data on the present status of EV market penetration in India. In light of the evolving Indian EV market, the study seeks to provide manufacturers, policymakers, and other industry players with useful information that will enable them to better align their strategies with customer preferences and market expectations.

Key words: *electric cars, Indian EV market, non-probability convenience sampling, government policies and incentives, EV adoption, consumer attitudes*

Emerging Consumer Preferences & Future of Electric cars in India

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